

# Hazardous Substances Emergency Events Surveillance in North Carolina



## Cumulative Report 2002-2003

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<http://www.epi.state.nc.us/epi/oii/hsees.html>

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## EXECUTIVE SUMMARY

The Hazardous Substances Emergency Events Surveillance (HSEES) system, maintained by the Agency for Toxic Substances and Disease Registry (ATSDR), actively collects information to describe the public health consequences of releases of hazardous substances in 15 states. This report summarizes the characteristics of events reported to the North Carolina Department of Health and Human Services, Division of Public Health in 2002 and 2003. Information about acute events involving hazardous substances was collected, including the substance(s) released, number of victims, number and types of injuries, and number of evacuations. The data were computerized using a web-based data entry system provided by ATSDR. Events involving releases of only petroleum were not included.

A total of 685 events were reported. In 639 (93.3%) events, only one substance was released. The most commonly reported categories of substances were volatile organic compounds, other inorganic substances, acids and bases. During this reporting period, 77 events (11.2% of all reported events) resulted in a total of 393 victims, of whom 12 (3.1%) died. The most frequently reported injuries were dizziness or other central nervous system symptoms, respiratory irritation, headache, and trauma. Evacuation reportedly was ordered for 69 (10.1%) events.

The findings regarding the percentages of events with victims and events with evacuations and the distributions of the numbers and types of injuries reported have been increasing slightly.

# **HAZARDOUS SUBSTANCES EMERGENCY EVENTS SURVEILLANCE SYSTEM 2002-2003 SUMMARY**

## **INTRODUCTION**

The Centers for Disease Control and Prevention defines surveillance as

“ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. The final link of the surveillance chain is the application of these data to prevention and control. A surveillance system includes a functional capacity for data collection, analysis, and dissemination linked to public health programs” [1].

Since 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) has maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences of releases of hazardous substances with the exception of petroleum-only releases. The decision to initiate a surveillance system of this type was based on a study published in 1989 about the reporting of hazardous substances releases to three national databases: the National Response Center Database, the Hazardous Material Information System (HMIS), and the Acute Hazardous Events Database [2]. A review of these databases indicated limitations. Many events were missed because of specific reporting requirements (for example, the HMIS did not record events involving intrastate carriers or fixed-facility events). Other important information was not recorded, such as the demographic characteristics of victims, the types of injuries sustained, and the number of persons evacuated. As a result of this

review, ATSDR implemented the HSEES system to more fully describe the public health consequences of releases of hazardous substances.

HSEES has four goals:

- To describe the distribution and characteristics of acute hazardous substances releases;
- To describe morbidity and mortality among employees, responders, and the general public that resulted from hazardous substances releases;
- To identify risk factors associated with the morbidity and mortality; and
- To identify strategies that might reduce future morbidity and mortality resulting from the release of hazardous substances.

For a surveillance system to be successful, it must not only be a repository for data, but also useful to protect public health.

In the last few years, the fourth goal of the HSEES system has been emphasized: to develop strategies to reduce subsequent morbidity and mortality by having each participating state analyze its data and develop appropriate prevention outreach activities. These activities are intended to provide industry, responders, and the general public with information that can help prevent chemical releases and reduce morbidity and mortality if a release occurs.

This report provides an overview of HSEES for 2002-2003 in North Carolina, summarizes the characteristics of acute releases of hazardous substances and their associated public health



consequences, and demonstrates how data from the system are translated into prevention activities to protect public health.

## **METHODS**

Beginning in 2002, a newly updated data-collection form, approved by the Office of Management and Budget, went into effect. For each event, information was collected about the event, substance(s) released, victims, injuries, and evacuations.

Various data sources were used to obtain information about these events. These sources included, but were not limited to, North Carolina Division of Emergency Management, National Response Center, State Bureau of Investigation, and news websites. Census data were used to estimate the number of residents in the vicinity of the events. All data were computerized using a Web-based data entry system provided by ATSDR.

HSEES defines hazardous substances emergency events as uncontrolled or illegal releases or threatened releases of hazardous substances. Events involving releases of only petroleum are not included. Events are included if (1) the amount of substance released (or that might have been released) needed (or would have needed) to be removed, cleaned up, or neutralized according to federal, state, or local law; or (2) release of a substance was threatened, but the threat led to an action (for example, evacuation) that could have affected the health of employees, emergency responders, or members of the general public. HSEES defines victims as people who suffer at least one adverse health effect within 24 hours of the event or who die as a consequence of the event. Victims who receive more than one type of injury are counted once in each applicable

injury type. Events are defined as transportation-related if they occur during surface, air, pipeline, or water transport of hazardous substances, or before being unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

For the data analyses in this report, the substances released were categorized into 16 groups. The category “mixture” comprises substances from different categories that were mixed before the event, and the category “other inorganic substances” comprises all inorganic substances except acids, bases, ammonia and chlorine.

## **RESULTS**

For 2002-2003, 685 hazardous substances emergency events were reported to HSEES: Thirty-seven (5.4%) of these events were threatened releases. A total of 318 (46.4%) occurred in fixed facilities.

For each fixed-facility event, one or two types of area involved in the release can be selected. Of all 318 fixed-facility events, 310 (97.5%) had one type of area (Figure 1a); 7 (2.2%), seven had a combination of two area types (Figure 1b), and one (0.3%) had no type of area reported. Among events with one type of area reported, the main area was classified as follows: 63 (19.9%) piping; 57 (18.0%) indoor, non-industrial areas (residences, retail businesses, etc.); 47 (14.8%) storage areas above ground (i.e., tank, storage shed, and warehouse); and 32 (10.1%) outdoor, non-farming, non-industrial areas. Of the seven events with two areas, four involved storage areas above ground (i.e., tank, storage shed, and warehouse) in combination with other types of area (Figure 1). Of the 367 transportation-related events, 329 (89.6%) occurred during ground

transport (e.g., truck, van, or tractor), and 34 (9.3%) involved transport by rail (Figure 2). Fewer events involved water and air transportation modes. The largest proportion of transportation-related events occurred during unloading of a stationary vehicle or vessel 185 (50.4%) and enroute then discovered at a fixed facility 97 (26.4%).

Factors contributing to the events consisted of primary and secondary entries and were reported for 669 (97.7%) events. Of reported factors, more than 124 (41.1%) of fixed-facility events and 285 (77.6%) of transportation-related events involved human error as the primary factor; 116 (38.4%) of fixed-facility and 80 (21.8%) of transportation-related events involved equipment failure as the primary factor (Figures 3a-3b). Secondary factors are illustrated in Figures 3c-3d.

More than 93 percent of all events involved the release of only one substance. Two substances were released in 12 (1.8%) events, and approximately 5 percent involved the release of more than two substances (Table 1). Fixed-facility events were more likely than transportation events to have two or more substances involved in an event (13.8% vs. 0.5%).

A total of 943 substances were either released or threatened to be released during the events. Two types of releases for each chemical (e.g., spill and air) could be reported. Threatened releases (210) do not have a release type. Of a total of 729 substances having type of release reported, only one type of release was associated with the following: air releases (97, 13.3%), spills (515, 70.6%), fires (32, 4.4%), and explosions (6, 0.8%). Two types of releases were reported for the following combinations: spill and air releases (1, 0.8%), and fires and

explosions (56, 70.9%); the remainder involved other combinations of release types, or unknown release types.

The number of events by month ranged from 76 (11.1%) in August to 42 (6.1%) in December, with the largest proportions occurring from July to September. The proportion of events ranged from 14.7 percent to 20.1 percent during week days, and from 5.4 percent to 8.3 percent during weekend days. Of all 681 (99.4%) events for which time of day or time category was reported, 32.2 percent occurred between 6:00 a.m. and 11:59 a.m.; 34.1 percent between 12:00 p.m. and 5:59 p.m.; 19.1 percent between 6:00 p.m. and 11:59 p.m., with the remainder occurring during the early hours of the day.

### ***Industries***

The largest proportions of HSEES events were associated with the transportation (375, 54.7%) and the manufacturing (115, 16.8%) industries (Table 2). The largest proportion of events with injuries occurred in the transportation and manufacturing industries (16, or 20.8% each). The greatest proportion of events with victims were the personal services industry (13, 16.9%) followed by the unspecified and unknown category (8, 10.4%) and the professional services industry (7, 9.1%).

### ***Substances***

A total of 943 substances were involved in all events, of which 66 (7.0%) were reported as threatened releases. The substances most frequently released were hydrochloric acid, ammonia, sodium hydroxide, and methyl alcohol (Appendix A). These substances were grouped into 16

categories. The categories most commonly involved in fixed-facility events were other inorganics (117, 20.4%), volatile organic compounds (113, 19.8%), and acids (69, 12.1%). In transportation-related events, the most common releases were volatile organic compounds (79, 21.5%), acids (64, 17.4%), and bases (58, 15.8%) (Table 3).

### ***Victims***

A total of 393 victims were involved in 77 events (11.2% of all events) (Table 4). Of the events with victims, 32 (41.5%) events involved only one victim, and 12 (15.6%) involved two victims. Of all victims, 367 (93.4%) were injured in fixed-facility events. Fixed-facility events were more likely to have more than one victim per event (64.5%) than were transportation events (33.3%) (Figure 4).

To represent the magnitude of the effects of substances involved in injuries, the number of events in a specific substance category was compared with the number of events in the same category that had victims. Substances in events that involved one or more substances from the same substance category were counted once in that category. Substances in events that involved two or more substances from different categories were counted once in the multiple-substance categories. Substances released most often were not necessarily the most likely to result in victims (Table 5). For example, events involving volatile organic compounds constituted 16.7% of all events. However, only 2.6% of these events resulted in injuries. Conversely, events involving oxy-organics and those in the multi-substances category exclusively comprised 6.6% and 6.0% of all events respectively, but 42.2% of these 45 events and 22.0% of 41 events resulted in injuries.

Employees (234, 59.5%) constituted the largest proportion of the population groups injured, followed by members of the general public (88, 22.4%), responders (44, 11.3%) and students (27, 6.9%) (Figure 4). Forty-four emergency response personnel were injured in fixed-facility events. Of those, 12 (27.3%) were police officers, 9 (20.5%) were career firefighters, and 9 (20.5%) were volunteer firefighters (Figure 5). No emergency-responder victims were injured in transportation-related events. No population group was more frequently victims in transportation-related events than in fixed-facility events.

Victims were reported to sustain a total of 547 injuries (Table 6). Some victims had more than one injury. Of all reported injuries, the most common injuries in fixed-facility events were dizziness or other central nervous system symptoms (175, 33.6%), respiratory irritation (132, 25.3%), headache (96, 18.4%), trauma (40, 7.7%), burns (38, 7.3%) and skin irritation (15, 2.9%). In transportation-related events, trauma (14, 53.8%), respiratory irritation (7, 26.9%), dizziness or other central nervous system symptoms (3, 11.5%) and skin irritation (2, 3.8%) were reported most frequently. In a large proportion of the instances, trauma might have resulted from a chain of events, such as a motor vehicle accident leading to the release of a hazardous substance, and not necessarily by the exposure to the substance itself.

Sex was known for 292 (74.3%) of the victims; of these 194 (66.4%) were males. Males constituted 87.4% of all employees and responders for whom sex was reported. The median age of the 24 (6.1%) victims for whom age was reported was 43 years (range: 0-74, where 0 includes victims <1 year old). Of these, none were children aged <10 years, and one was a child aged 10-

18 years. For the 329 (83.7%) injured persons for whom age was not reported, 240 (72.9%) were presumably adults (first responders and employees), 27 (8.2%) were students, and 62 (18.8%) could have been adults or children (members of the general public or the category of victims was not known). The largest proportion of victims, 285 (72.9%), were treated and released at a hospital; 59 (15.1%) were treated on-scene with first aid, and 12 (3.1%) died (Figure 6).

The status of personal protective equipment (PPE) use was reported for 224 (95.7%) employees and for 36 (81.8%) first-responder victims. Most of the employees, 220 (98.2%), and 16.7% of first responders had not worn any form of PPE. Employees who wore PPE most often used gloves and eye protection (4, 1.8%). Among first responders who wore PPE, 21 (58.3%) wore firefighter turnout gear with respiratory protection; six (16.7%) wore firefighter turnout gear without respiratory protection; and three (8.3%) wore Level “C”.

Three events involved more than 30 injured people per event. Two of the three events with more than 30 people injured were caused by carbon monoxide. The first event required 33 people to seek treatment for headaches and dizziness when a propane furnace was not properly vented at a construction equipment manufacturing facility. The second event required 54 people at a gift wrap and candy distribution center to seek treatment for carbon monoxide exposure due to a refrigerated truck running at the loading dock. The third event, involving 40 victims, occurred due to a dust explosion at a pharmaceutical manufacturing facility. In this event, many of the victims were hospitalized and six were killed.

### ***Evacuations***

Evacuations were ordered in 69 (10.1%) events where evacuation status was reported. Of these evacuations, 67.6% were of a building or the affected part of a building; 27.9% were of a defined circular area surrounding the event locations; and the remainder were of a downwind or downstream area, a circular and downwind or downstream area, of no criteria, or not known. The number of people evacuated was known for 69 events and ranged from one to 3,300 people, with a median of 20. However, two ordered evacuations were reported as having no evacuees. The median length of evacuation was two hours. In 88.4% of events for which evacuation was ordered, access to the area was restricted. Three events had in-place sheltering ordered by an official.

### ***Response***

A contingency plan was known to be followed in 684 (99.8%) of events. Of these, 63.3% involved the use of company operating procedures, 13.8% reported using hazmat or response team standard operating procedures, 11.0% involved a law enforcement agency, and 9.6% had a fire department response. The remainder involved combinations of the above plans or other plans.

## **PREVENTION ACTIVITIES**

During 2002-2003, the North Carolina HSEES program performed various prevention activities. These activities included:

- A fact sheet for mercury.



- Oral and written presentation of HSEES findings to top spilling counties.
- An information sheet on methamphetamine labs and the chemicals used in these labs.
- Dissemination of NC HSEES Information: Four year data analysis (1998-2001) and quarterly updates of NC HSEES data.
- Creation and distribution of a prevention of carbon monoxide injury and/or death related to improper use of heating sources brochure.

The North Carolina HSEES Internet website page is available at

<http://www.epi.state.nc.us/epi/oii/hsees.html>. At this site, annual reports and other information can be downloaded.

## **NORTH CAROLINA CONCLUSIONS**

Since 1991, the North Carolina Department of Health and Human Services, Division of Public Health has participated in the HSEES system. During 2002-2003, 685 events were reported. Fixed facilities accounted for 46.4% of the events, while transportation was slightly higher at 53.6%. While transportation events still outnumber fixed-facility events, the gap between the two seems to be narrowing without any explanation. The top releasing counties continue to be Mecklenburg, Forsyth, Guilford, and Wake (Appendix B). The percentage of events with victims remains similar to the percentages illustrated in the 1998-2001 summary. One change to note in the data is the top ten substances released. Chlorine is not in this list, as it has been in years past, and iodine and hydrogen peroxide are now in the list. The decline in chlorine releases could be due to changes in waste water treatment facilities. The increase in iodine and hydrogen peroxide releases is attributable to the increase in methamphetamine laboratories discovered in

the state in recent years. Although there are a few changes in the 2002-2003 data, most results mirror those of previous years.

## **SUMMARY OF RESULTS, 1993-2003**

During 1993-2003, the largest proportion of events occurred in fixed facilities (Table 7). The number of reported transportation-related events increased but may have reached a plateau. The increase is partially due to the utilization of the U.S. Department of Transportation's Hazardous Materials Information System as a primary notification source for transportation events. In addition, the total number of events continued to increase over time (Figure 7). The increase in the number of events may have been due, at least in part, to the expansion of reporting sources.

In events involving victims, respiratory symptoms consistently have been most frequently reported. The number of deaths associated with events continues to suggest the need to evaluate not only the danger posed by exposure to hazardous substances, but also the circumstances surrounding the events (e.g., a crash resulting from high-speed travel of a truck pulling an ammonia tank). Employees continue to be the most commonly reported victims of emergency events. However, members of the general public, responders, and students constitute a large proportion as well (Figure 8).

The findings from the HSEES data analyses regarding the proportions of the number of events with victims, events with evacuations, and the distributions of the numbers and types of injuries reported have been consistent over time.

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2. Binder S. Death, injuries, and evacuations from acute hazardous materials releases. Am J Public Health 1989; 70:1042-4.

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## **APPENDICES**

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Appendix A.—The 10 most frequent substances involved in events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003

Number	Standardized Substance Name	Frequency
1.	Hydrochloric Acid	42
2.	Ammonia	40
3.	Sodium Hydroxide	35
4.	Methyl Alcohol	27
5.	Acetone	26
6.	Phosphoric Acid	25
7.	Sulfuric Acid	24
8.	Hydrogen Peroxide	21
9.	Iodine	20
10.	Resin Solution	20
Total		280



Appendix B.—Number of events meeting the surveillance definition, by county and type of event.  
Hazardous Substances Emergency Events Surveillance, North Carolina, 2002-2003.

County	Fixed facility		Transportation		Total no. of events
	No. of Events	Percentage	No. of Events	Percentage	
Alamance	7	100.0%	0	0.0%	7
Alexander	4	100.0%	0	0.0%	4
Anson	1	33.3%	2	66.7%	3
Ashe	3	100.0%	0	0.0%	3
Avery	3	100.0%	0	0.0%	3
Beaufort	8	80.0%	2	20.0%	10
Bertie	1	100.0%	0	0.0%	1
Bladen	2	100.0%	0	0.0%	2
Brunswick	3	42.9%	4	57.1%	7
Buncombe	5	55.6%	4	44.4%	9
Burke	1	50.0%	1	50.0%	2
Cabarrus	4	30.8%	9	69.2%	13
Caldwell	1	100.0%	0	0.0%	1
Camden	1	100.0%	0	0.0%	1
Catawba	7	38.9%	11	61.1%	18
Chatham	0	0.0%	3	100.0%	3
Cherokee	1	100.0%	0	0.0%	1
Cleveland	4	100.0%	0	0.0%	4
Columbus	4	80.0%	1	20.0%	5
Craven	5	62.5%	3	37.5%	8
Cumberland	15	65.2%	8	34.8%	23
Davidson	2	25.0%	6	75.0%	8
Duplin	7	87.5%	1	12.5%	8
Durham	10	52.6%	9	47.4%	19
Edgecombe	3	75.0%	1	25.0%	4
Forsyth	22	40.7%	32	59.3%	54
Franklin	0	0.0%	3	100.0%	3
Gaston	6	40.0%	9	60.0%	15
Graham	2	100.0%	0	0.0%	2
Granville	1	25.0%	3	75.0%	4
Guilford	19	38.8%	30	61.2%	49
Halifax	2	50.0%	2	50.0%	4
Harnett	4	66.7%	2	33.3%	6
Haywood	4	80.0%	1	20.0%	5
Henderson	6	50.0%	6	50.0%	12

County	Fixed facility		Transportation		Total no. of events
	No. of Events	Percentage	No. of Events	Percentage	
Hoke	2	100.0%	0	0.0%	2
Iredell	1	14.3%	6	85.7%	7
Johnston	3	50.0%	3	50.0%	6
Lee	2	50.0%	2	50.0%	4
Lenoir	2	22.2%	7	77.8%	9
Macon	3	100.0%	0	0.0%	3
Madison	0	0.0%	1	100.0%	1
Martin	1	100.0%	0	0.0%	1
McDowell	2	100.0%	0	0.0%	2
Mecklenburg	31	20.3%	122	79.7%	153
Mitchell	3	100.0%	0	0.0%	3
Montgomery	0	0.0%	1	100.0%	1
Moore	1	100.0%	0	0.0%	1
Nash	2	22.2%	7	77.8%	9
New Hanover	9	52.9%	8	47.1%	17
Northampton	1	50.0%	1	50.0%	2
Onslow	5	83.3%	1	16.7%	6
Orange	6	85.7%	1	14.3%	7
Person	2	100.0%	0	0.0%	2
Pitt	3	42.9%	4	57.1%	7
Polk	1	100.0%	0	0.0%	1
Randolph	5	71.4%	2	28.6%	7
Richmond	3	42.9%	4	57.1%	7
Robeson	5	83.3%	1	16.7%	6
Rockingham	5	83.3%	1	16.7%	6
Rowan	3	42.9%	4	57.1%	7
Rutherford	6	60.0%	4	40.0%	10
Sampson	3	100.0%	0	0.0%	3
Scotland	2	66.7%	1	33.3%	3
Stanly	3	60.0%	2	40.0%	5
Surry	2	40.0%	3	60.0%	5
Transylvania	2	100.0%	0	0.0%	2
Union	5	71.4%	2	28.6%	7
Vance	2	100.0%	0	0.0%	2
Wake	9	32.1%	19	67.9%	28
Washington	0	0.0%	2	100.0%	2
Watuaga	9	100.0%	0	0.0%	9

County	Fixed facility		Transportation		Total no. of events
	No. of Events	Percentage	No. of Events	Percentage	
Wayne	2	66.7%	1	33.3%	3
Wilkes	2	100.0%	0	0.0%	2
Wilson	2	66.7%	1	33.3%	3
Yadkin	0	0.0%	2	100.0%	2
Yancey	0	0.0%	1	100.0%	1
Total	318	46.4%	367	53.6%	685

## Appendix C

Figure 1a.—Areas of fixed facilities involved in events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

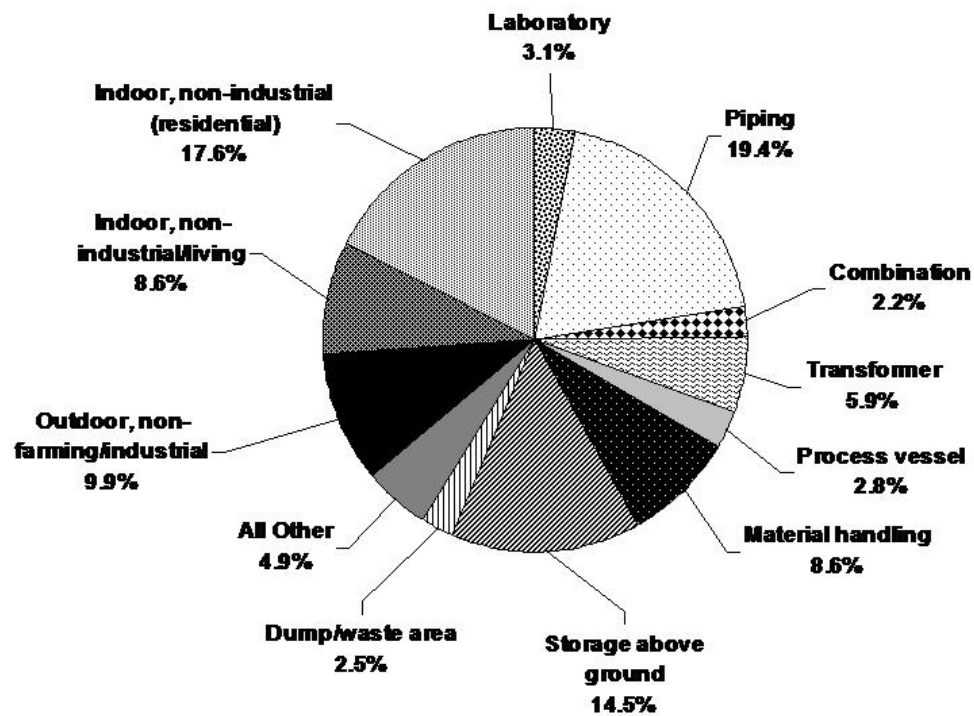


Figure 1b.—Combination areas of fixed facilities involved in events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

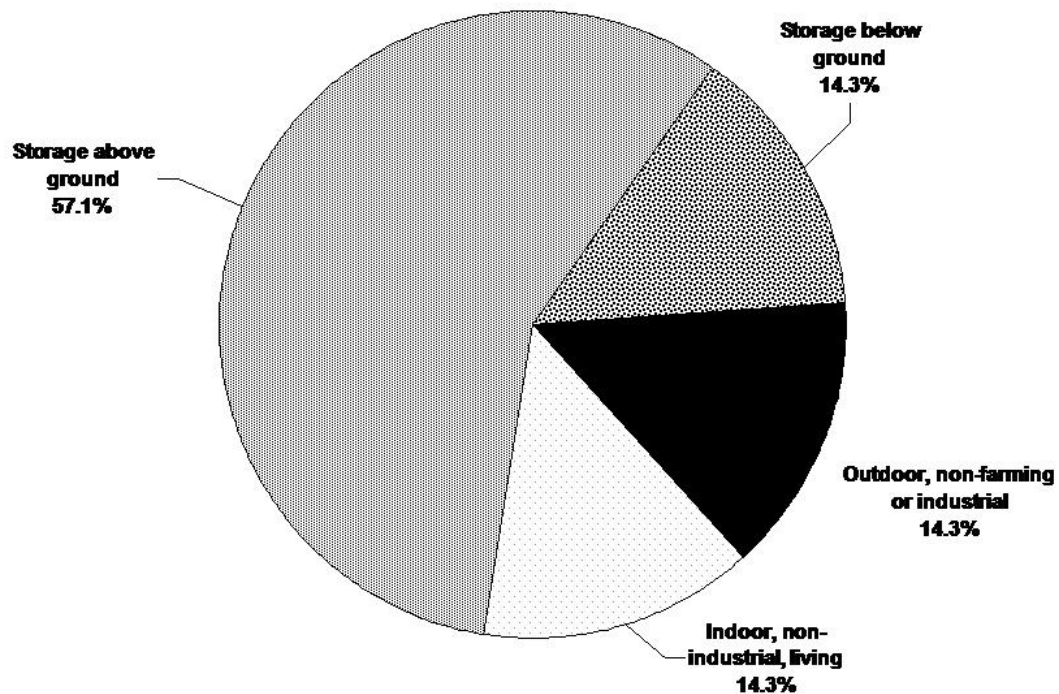
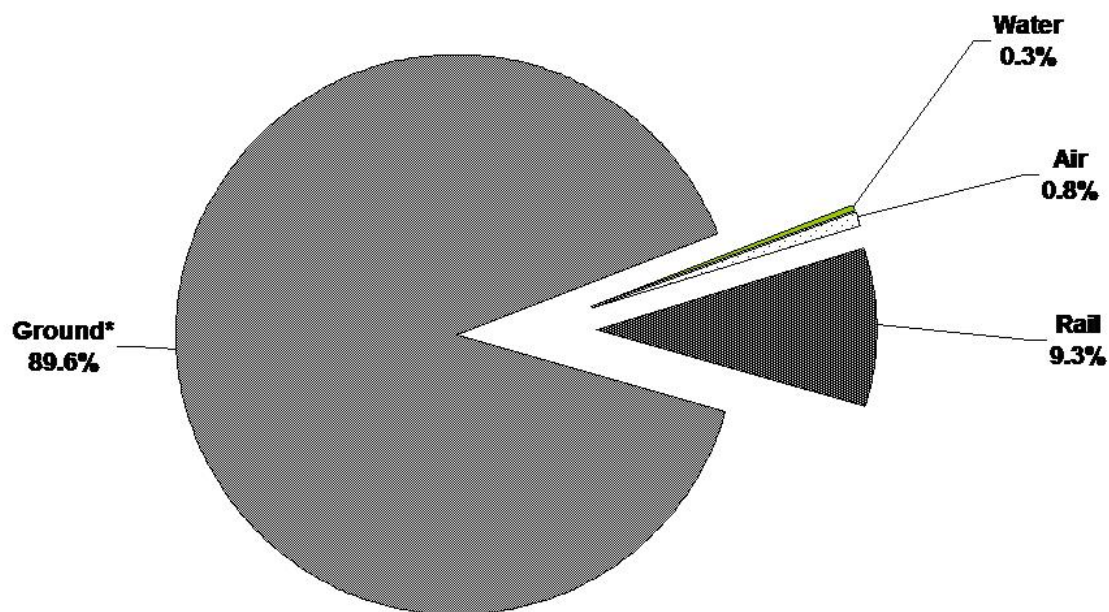


Figure 2.—Distribution of transportation-related events, by type of transport, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*Transport in a truck, van, or trailer.

Figure 3a.—Primary factors reported as contributing to the occurrence of fixed-facility events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

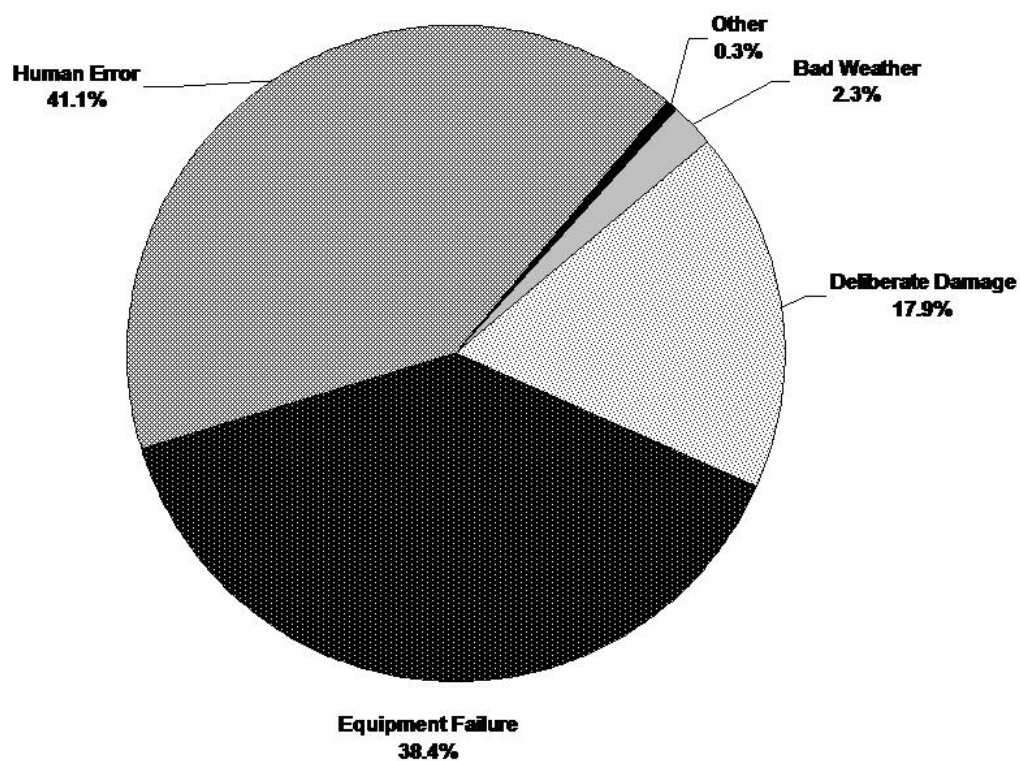


Figure 3b.—Primary factors reported as contributing to the occurrence of transportation-related events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

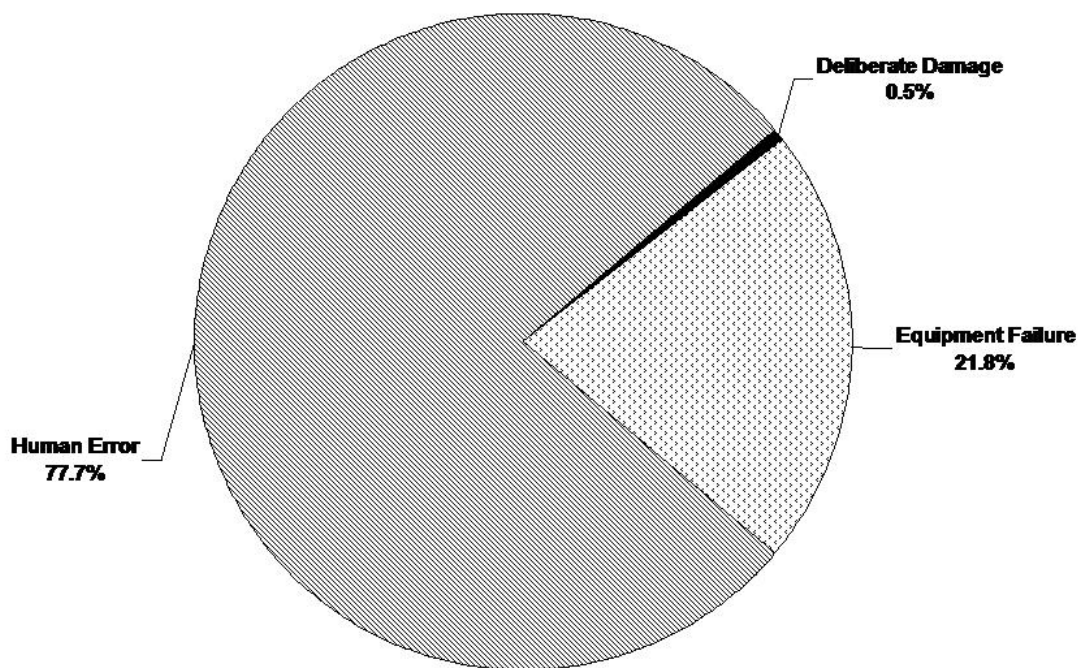
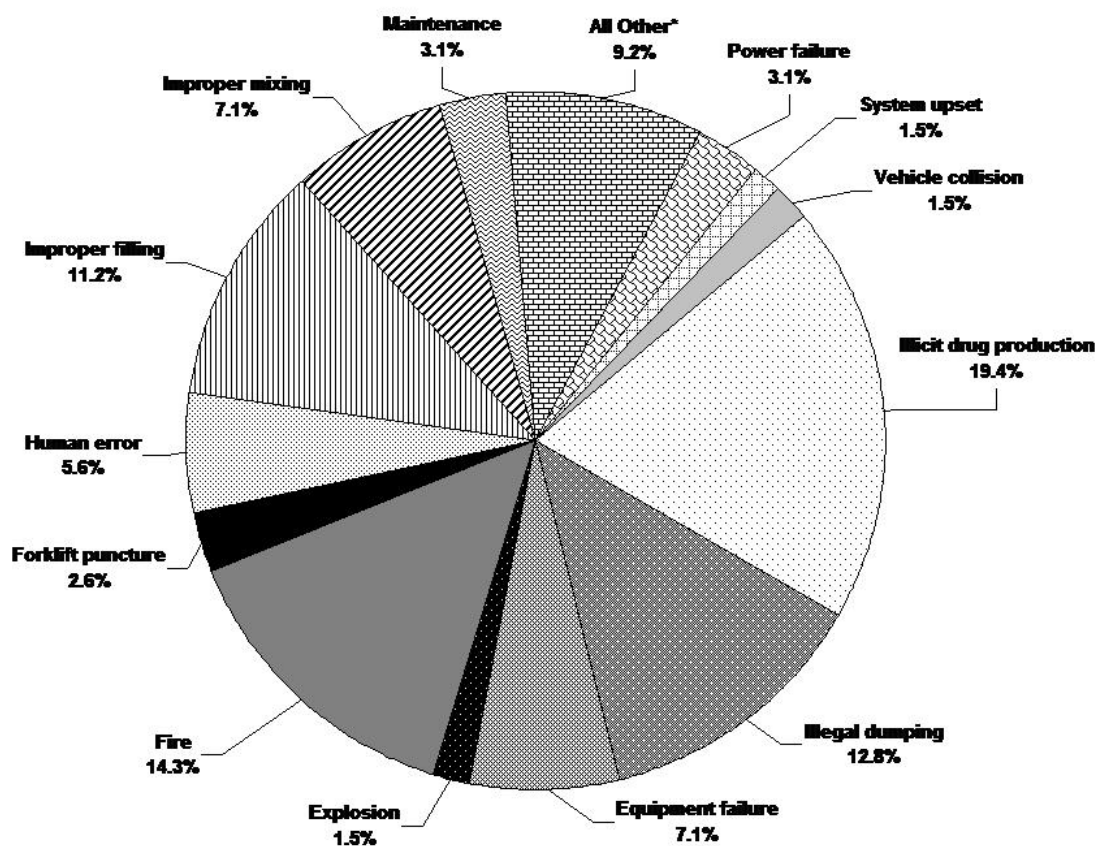


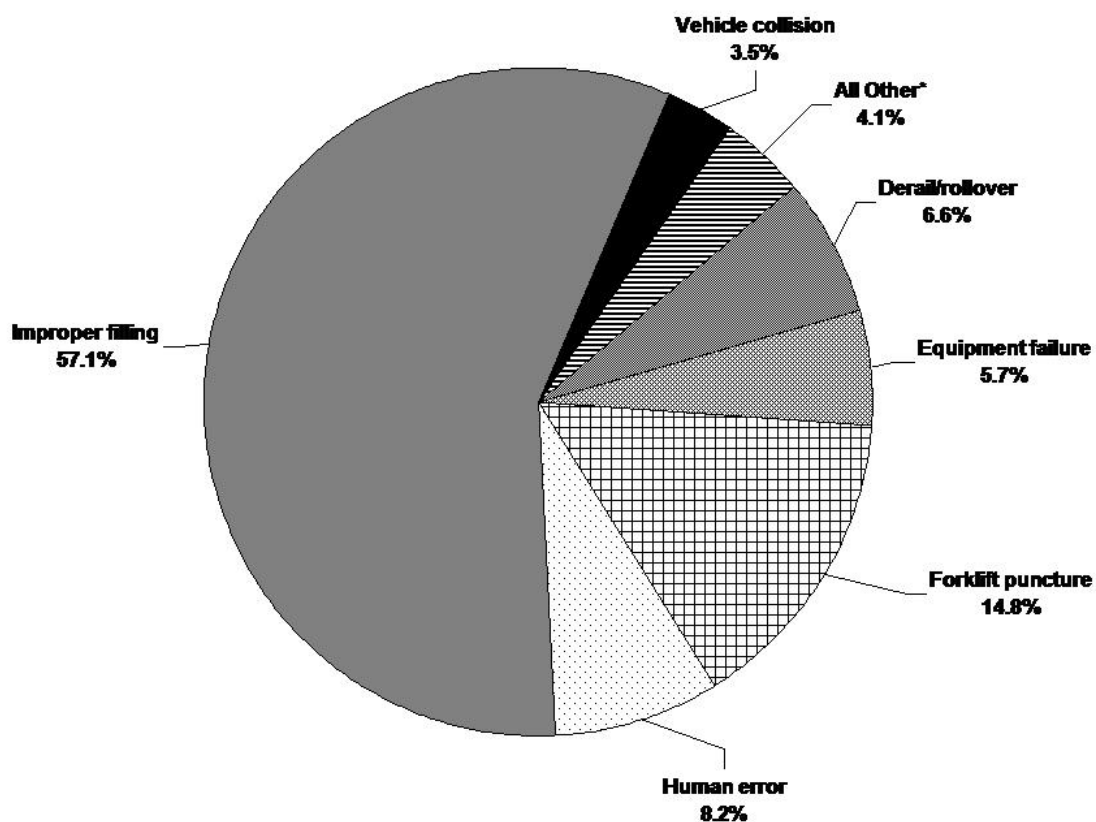


Figure 3c.—Secondary factors reported as contributing to the occurrence of fixed-facility events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*All other includes derail/rollover, overspray/misapplication, start-up/shut-down.

Figure 3d.—Secondary factors reported as contributing to the occurrence of transportation-related events, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*All other includes illegal drug production, dumping, explosion, fire, and load shift.

Figure 4.—Distribution of victims, by population group and type of event, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

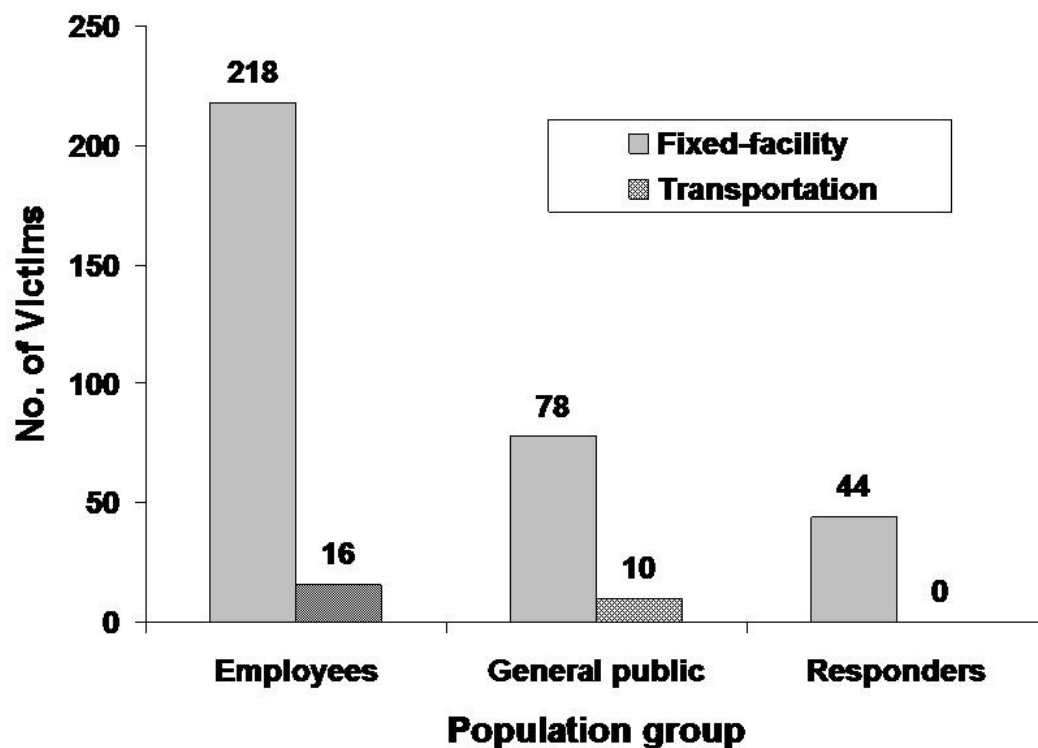


Figure 5.—Distribution of responders injured in fixed-facility events, by population group\*, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

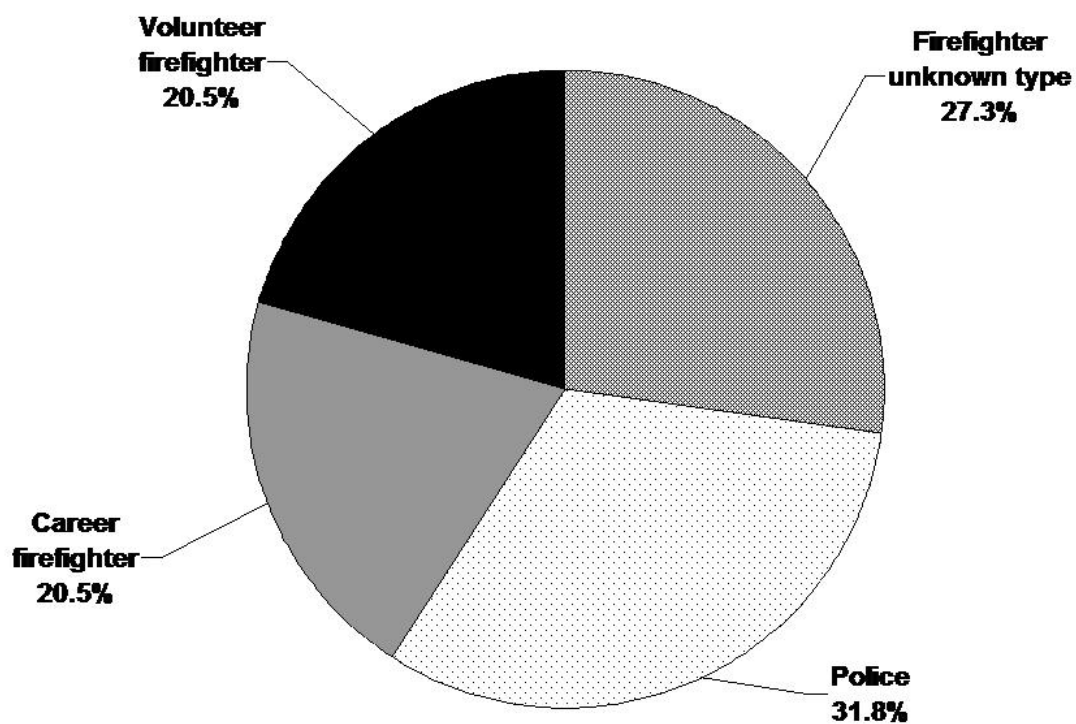
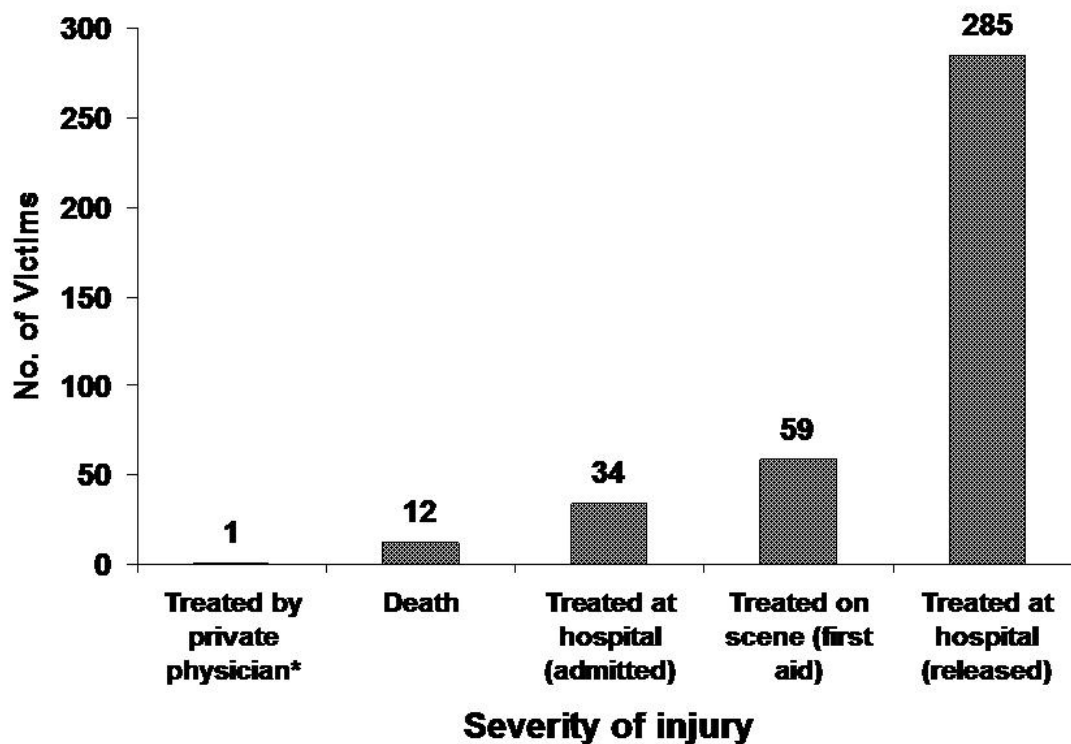


Figure 6.—Distribution of victim severity/disposition, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*Treatment within 24 hours of injury.

Figure 7.—Cumulative data, North Carolina Hazardous Substances Emergency Events Surveillance, 1993-2003.

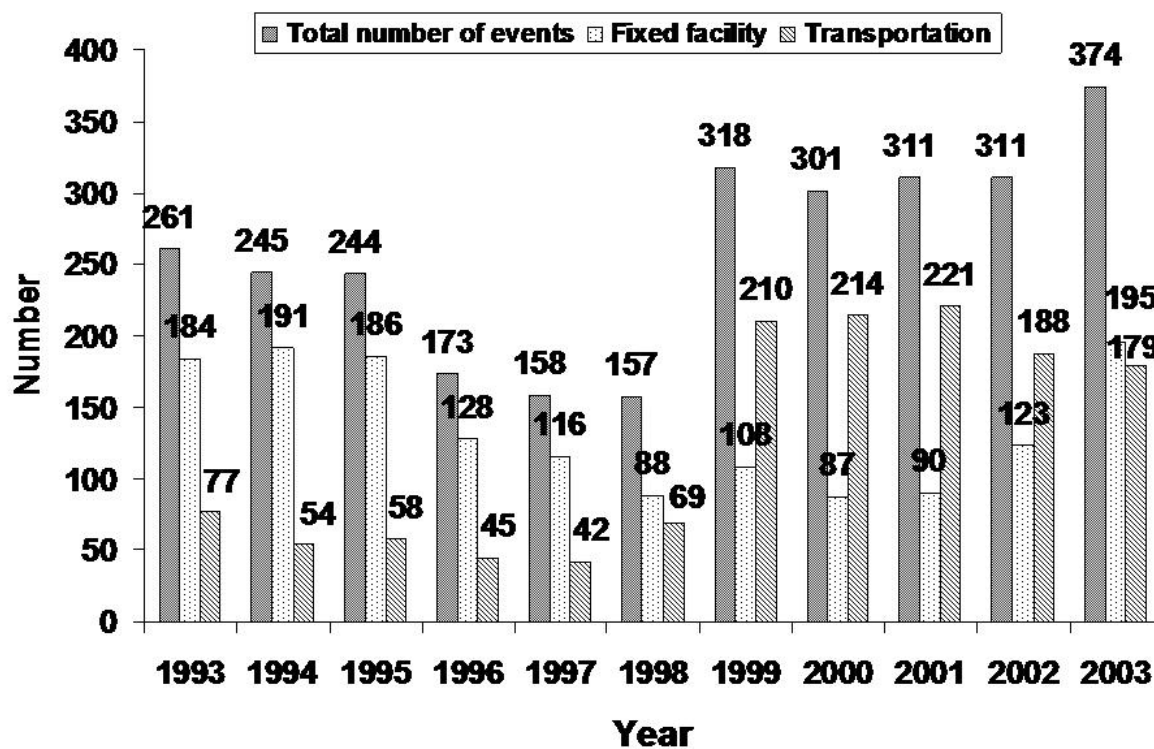
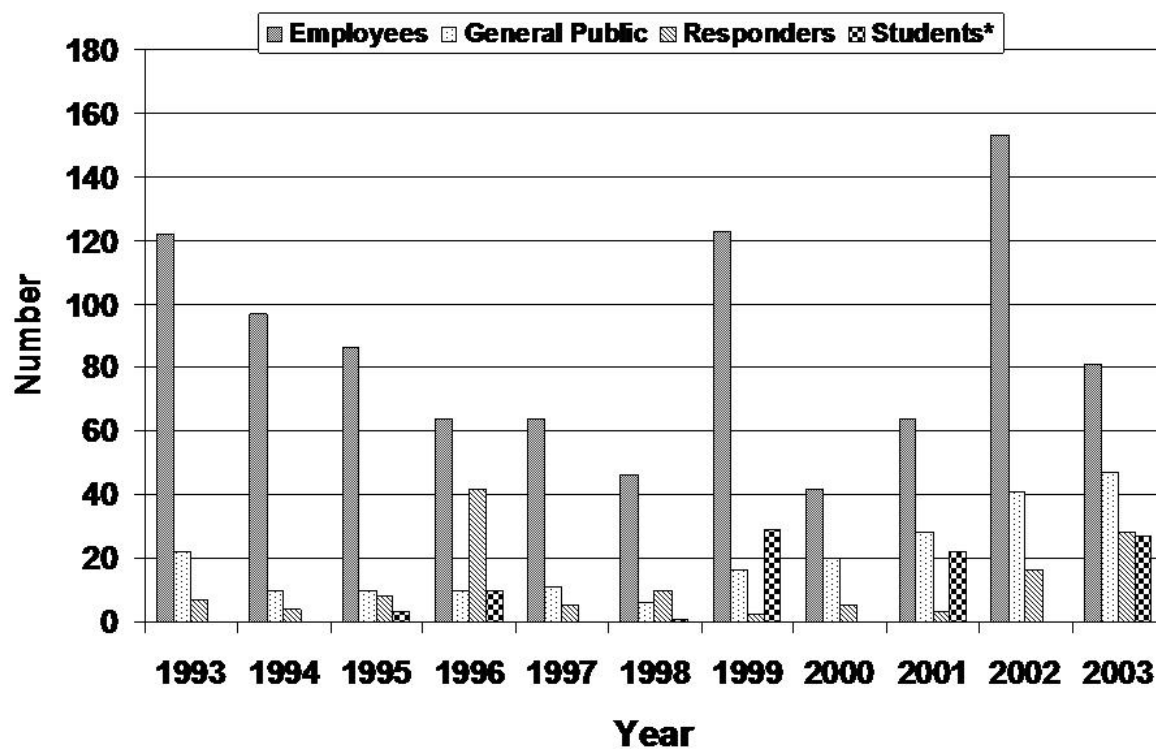


Figure 8.—Distribution of victims, by year, North Carolina Hazardous Substances Emergency Events Surveillance, 1993-2003.



\*The category of “student” did not become available until 1996.

Table 1.—Number of substances involved per event, by type of event, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	274	86.2	274	365	99.5	365	639	93.3	639
2	10	3.1	20	2	0.5	4	12	1.8	24
3	8	2.5	24	0	0.0	0	8	1.2	24
4	1	0.3	4	0	0.0	0	1	0.1	4
≥ 5	25	7.9	252	0	0.0	0	25	3.6	252
Total	318	100	574	367	100	369	685	100	943



Table 2.—Industries involved in hazardous substances events, by category, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

Industry category	Total events		Events with victims		Percentage all events with victims	Total no. victims # (range)*
	No.	%	No.	%		
Agriculture	8	1.2	3	3.9	0.4	10 (2-5)
Mining	0	0.0	0	0.0	0.0	-
Construction	6	0.9	2	2.6	0.3	15 (4-13)
Manufacturing	115	16.8	16	20.8	2.3	131 (1-54)
Transportation	375	54.7	16	20.8	2.3	42 (1-13)
Communications	0	0.0	0	0.0	0.0	-
Utilities	38	5.5	3	3.9	0.4	4 (1-2)
Wholesale trade	5	0.7	0	0.0	0.0	-
Retail trade	11	1.6	4	5.2	0.6	23 (2-13)
Finance	1	0.1	1	1.3	0.1	2 (0-2)
Business and repair services	8	1.2	2	2.6	0.3	5 (1-4)
Personal services	29	4.2	13	16.9	1.9	53 (1-26)
Entertainment	5	0.7	1	1.3	0.1	2 (0-2)
Professional services	20	2.9	7	9.1	1.0	80 (1-33)
Public administration	6	0.9	0	0.0	0.0	-
Active Duty Military	9	1.3	1	1.3	0.1	1 (0-1)
Unspecified and unknown	49	7.2	8	10.4	1.2	25 (1-5)
Total	685	100	77	100	11.0	393 (1-54)

Table 3.—Number of substances involved, by substance category and type of event, North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	69	12.1	64	17.4	133	14.1
Other*	37	6.5	19	5.2	56	6.0
Mixture†	14	2.4	5	1.4	19	2.0
Ammonia	35	6.1	5	1.4	40	4.3
Bases	28	4.9	58	15.8	86	9.1
Chlorine	19	3.3	6	1.6	25	2.7
Other inorganic substances‡	117	20.5	32	8.7	149	15.8
Paints & dyes	17	3.0	26	7.1	43	4.6
Pesticides	29	5.1	22	6.0	51	5.4
Polychlorinated biphenyls	19	3.3	0	0.0	19	2.0
Volatile organic compounds	113	19.8	79	21.5	192	20.4
Formulations	2	0.3	0	0.0	2	0.2
Hetero-Organics	13	2.3	7	1.9	20	2.1
Hydrocarbons	2	0.3	1	0.2	3	0.3
Oxy-Organics	36	6.3	21	5.7	57	6.1
Polymers	22	3.8	23	6.3	45	4.8
Total¶	572	100	368	100	940	100

\* Not classified.

† Substances from different categories that were mixed prior to the event.

‡ All inorganic substances except for acids, bases, ammonia and chlorine.

¶ Of a total of 943 substances, 3 were excluded because they were not assigned a substance category.

Table 4.—Frequency of the number of victims by type of event, North Carolina Hazardous Substances Emergency events Surveillance, 2002-2003.

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. of events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	22	35.5	22	10	66.7	10	32	41.5	32
2	10	16.1	20	2	13.3	4	12	15.6	24
3	8	12.9	24	1	6.7	3	9	11.7	27
4	3	4.8	12	1	6.7	4	4	5.2	16
5	6	9.7	30	1	6.7	5	7	9.1	35
≥ 6	13	21.0	259	0	0.0	0	13	16.9	259
Total	62	100	367	15	100	26	77	100	393

Table 5.—Frequency of substance categories in all events and events with victim, North Carolina Hazardous Substances Emergency Events Surveillance System, 2002-2003.\*

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	96	14.0	7	9.1	7.3
Other†	32	4.7	5	6.5	15.6
Mixture‡	18	2.6	6	7.8	33.3
Ammonia	34	5.0	5	6.5	14.7
Bases	69	10.1	1	1.3	1.4
Chlorine	24	3.5	4	5.2	16.7
Other inorganic substances¶	69	10.1	7	9.1	10.1
Paints & dyes	40	5.8	3	3.9	7.5
Pesticides	41	6.0	5	6.5	12.2
Polychlorinated biphenyls	19	2.8	0	0.0	0.0
Volatile organic compounds	114	16.7	3	3.9	2.6
Multiple substance categories	41	6.0	9	11.7	22.0
Formulations	2	0.3	0	0.0	0.0
Hetero organics	9	1.3	0	0.0	0.0
Hydrocarbons	2	0.3	0	0.0	0.0
Oxy-organics	45	6.6	19	24.7	42.2
Polymers	29	4.2	3	3.9	10.3
<b>Total€</b>	<b>684</b>	<b>100</b>	<b>77</b>	<b>100</b>	<b>--</b>

\* Substances in events that involved multiple substances were counted only once in a substance category when all the substances were associated with the same category. If events that involved multiple substances from different substance categories they were counted only once in the multiple substance categories.

† Not classified.

‡ Substances from different categories that were mixed prior to the event.

¶ All inorganic substances except for acids, bases, ammonia, and chlorine.

€ Of a total of 685 events, 1 event was not included. The substance category was missing for that one event.

Table 6.—Frequencies of injuries/symptoms, by type of event,\* North Carolina Hazardous Substances Emergency Events Surveillance, 2002-2003.

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Trauma	40	7.7	14	53.8	54	9.9
Respiratory	132	25.3	7	26.9	139	25.4
Eye	10	1.9	0	0.0	10	1.8
Gastrointestinal system	12	2.3	0	0.0	12	2.2
Heat stress	0	0.0	0	0.0	0	0.0
Chemical burns	38	7.3	0	0.0	38	6.9
Other	2	0.4	0	0.0	2	0.4
Skin	15	2.9	2	7.7	17	3.1
Dizziness or other central nervous system	175	33.6	3	11.5	178	32.5
Headache	96	18.4	0	0.0	96	17.6
Heart problems	0	0.0	0	0.0	0	0.0
Shortness of breath	1	0.2	0	0.0	1	0.2
<b>Total†</b>	<b>521</b>	<b>100</b>	<b>26</b>	<b>100</b>	<b>547</b>	<b>100</b>

\*The number of injuries is greater than the number of victims (393) because a victim could have had more than one injury.

Table 7.— Cumulative data by year, North Carolina Hazardous Substances Emergency Events Surveillance, 1993-2003.\*

Year	Type of event			No. substances Involved	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	%†
1993	184	77	261	306	151	2	58	22.2
1994	191	54	245	273	111	1	36	14.7
1995	186	58	244	285	107	0	30	12.3
1996	128	45	173	185	126	1	32	18.5
1997	116	42	158	172	80	4	26	16.5
1998	88	69	157	183	63	1	23	14.6
1999	108	210	318	349	170	2	32	10.1
2000	87	214	301	314	67	0	26	8.6
2001	90	221	311	360	117	1	25	8.0
2002	123	188	311	340	210	4	39	12.5
2003	195	179	374	603	183	8	38	10.2
Total‡	1496	1357	2853	3370	1385	24	365	12.8

\* Numbers in the table may differ from those reported in previous years because of adjustments in HSEES qualification requirements for events.

† Percentage of events with victims